# Rhodora

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 3 July, 1901 No. 31

# THOMAS CONRAD PORTER.

THOMAS MEEHAN.

In the death of Dr. Porter, a high priest in botany passes away, and the science loses one of its brightest ornaments. It is a serious blow to American botany.

He was born in Alexandria, a small village in Huntington County among the Allegheny Mountains of Pennsylvania, on January 22d, 1822. In due time he entered Lafayette College at Easton, Pennsylvania, and graduated in 1840. With a predilection for the ministry he took a course in the Princeton Theological Seminary, and in 1843 was ordained a minister. His love for natural history, however, in time induced him to leave his ministerial calling. In 1849 he accepted the Professorship of Natural History in Marshall College, and in 1853 the same position in Franklin College at Lancaster. Finally in March 1866 he was offered by his Alma Mater, Lafayette College, the chair of Botany and Zoology, a position which he accepted and occupied from the following September until his death on the April 27th last. He received the honorary degree of Doctor of Divinity, and later that of Doctor of Laws.

The circumstances attending his passing away are pathetic. For some time he had been complaining of what he supposed to be dyspepsia, regarded by him only as something that interfered with active work. At the last hour he was writing to a friend, Benjamin H. Smith of Philadelphia, that his physical condition was too weak for much bodily exertion, but with the return of spring he should revive, and proposed an excursion to the Pocono mountains at the end of May. Having written thus far, he was interrupted by his housekeeper, — Mrs. Porter had died about two months previously,

—who came to his study to inquire if he was ready for supper. In ten minutes she returned to announce that it was on the table. The letter to his friend was unfinished, — he was dead!

Dr. Porter was a man of remarkably broad education. He was well acquainted with both modern and classical languages. A poet of no mean power, he was especially fond of translating German hymns into English verse, and many of his own poems are of high worth. He was by no means a specialist, but was an adept in the leading branches of physical as well as natural science. His chief love, however, was for botany, in which mainly his distinguished reputation was so well earned. Early in his career he planned the preparation and publication of a complete Flora of Pennsylvania. It was hoped that this would appear in the reports of State Geological Survey, but he was not satisfied with the conditions of publication. His great desire to have everything as complete as possible kept him continually thinking that more was yet to be done. His journeyings to and fro through the State, and his voluminous correspondence with those who showed any disposition to assist him in securing exact information in regard to the plants of the region, was remarkable. Indeed the earnestness and completeness with which he answered inquiries from his correspondents was a rare feature in his character. He rarely complained of the inroads on his time, but on one occasion thought he might exposulate a little. As the question discussed is still a mooted one, it may not be out of place to quote: —

"Because I am a Professor of Botany, does it follow that I must know everything about plants? Must I be exposed to a perpetual fire of questions and cross-questions? Can I take my 'davy that the fronds of *Asplenium pinnatifidum* never root at the tips? All I can say is that I have never seen them do it, and I have seen a goodly number in their native haunts. Perhaps they fail in the same manner that some men are virtuous for lack of opportunity. Protruded from the crevices or pockets on faces of cliffs, they encounter the dry rock only, and get no encouragement to go walking further as *Camptosorus* does, which grows in less dry places. If the conditions were changed, the *Asplenium* might behave as the *Camptosorus*, who can tell?"

Although he died before his Flora of Pennsylvania appeared in print, it is a satisfaction for the sake of his memory, and for botany to know that he regarded it as practically finished, and was about to send the first installment of copy to the printer, Mr. A. A. Heller of Lancaster; and that it is understood his nephew, Dr. J. K. Small, will edit the work.

Dr. Porter's "Flora of Colorado" published as part of Hayden's Survey of the territories, was long the only hand-book for botanists in that region. A number of species have been named in his honor, as well as the genus *Porterella*, so named by Dr. Gray.

As a member of an excursion party his boundless enthusiasm became the life of the company. It is among the proudest memories of a young botanist's life to have been on such a trip with Dr. Porter. Although like most persons who are slow to make up their minds until they have the actual facts before them, he was very positive in defending an opinion once formed, yet he gladly welcomed any new fact from even the humblest source. Few will forget the intense pleasure his discovery in 1867 of *Sedum Rhodiola* on the face of cliffs two hundred feet above the Delaware River, gave to him as a proof of its glacial deposit there ages ago.

With the passing away of Torrey, Engelmann, Gray, Chapman, Porter and other botanists, of the last generation, readily recalled an era in American botany closes.

GERMANTOWN, PENNSYLVANIA.

## NOTES ON THE ERICACEAE OF NEW ENGLAND.

WALTER DEANE.

As two years have passed since the publication of the Preliminary List of New England Plants, — I, dealing with the *Ericaceae* (RHODORA, I, pp. 93–94), it seems best to make such additions and corrections as will bring the List to date and represent our knowledge of the New England representatives of the family at the present time. The genera here, as in the list, are arranged alphabetically.

*Gaylussacia dumosa*, Torr. & Gray. Through the kindness of Mr. A. A. Eaton I have received a specimen of this species collected by him at French's Pond, North Hampton, New Hampshire, in 1898, where it is "tolerably abundant." A cross can now mark this in my list. Mr. Eaton has already recorded this species from a bog in Nottingham, New Hampshire, in RHODORA, II, p. 168.

*Gaylussacia dumosa*, var. *hirtella*, Gray. Mr. M. L. Fernald has kindly called my attention to the fact that the specimens on which I based my Massachusetts and Rhode Island records of this variety, so named by Wm. Boott and S. T. Olney on the sheets containing the specimens in the Gray Herbarium, have not the glandular-hirsute or hispid character that properly belongs to this form and is exhibited in plants from further south. This name accordingly should be dropped from my list.

*Gaylussacia resinosa*, var. *glaucocarpa*, Robinson. I have visited several times the type locality of this plant in Jaffrey, New Hampshire, and was pleased to see the article by Dr. B. L. Robinson in RHODORA, II, pp. 81–83, in which he gives varietal distinction to this blue-fruited form of our common huckleberry. In RHODORA II, p. 168, Mr. A. A. Eaton states that *glaucocarpa* "is more abundant in the coast towns of Rockingham county, New Hampshire, than the type; the fruit is larger, juicier and more generally esteemed." This shows that the plant is well recognized by the country people at large. Dr. C. B. Graves has kindly sent me specimens of this variety collected by him in Waterford and Groton, Connecticut, in August, 1898. In reply to my inquiries in regard to the relative size of the fruit, abundance and general distribution of the plant, Dr. Graves writes under date of March 3, 1901, "With regard to the berries of *glaucocarpa*, I should say that on the whole and as a rule when fully grown they were quite as large as those of the species. I have seen some very large berries. . . . I should call the plants abundant at the points where I have noticed them. As a rule they grow in little irregular patches of eight or ten square yards, with little or no admixture of the species, which, however, usually grows near by. Much more rarely in my experience they grow mingled together. For table uses they seem to me just as good as *G. resinosa* and I could detect no difference either in flavor or in relative seediness." I have also seen in the Gray Herbarium and that of Mr. J. H. Sears of Salem, specimens of *glaucocarpa* from Topsfield, Massachusetts, collected in June and July, 1899, by Mr. Sears and referred to by Dr. Robinson together with Dr. Graves' plants, in his paper on the subject. I am glad to report this variety from Maine also. Mr. E. L. Rand has shown me specimens in his herbarium from the Island of Mt. Desert, Maine, collected by him, on September 7 and 8, 1896, on Ox Hill, Seal Harbor; on the Western Triad, and in a clearing near Jordan Pond. These points are within two or three miles of each other. The plant is evidently distributed widely over the Island, for Mr. Rand says that the berry pickers whose occupation takes them over widely separated localities seem to be well acquainted with this blue variety and to recognize its large size in comparison with the common form. This places a cross against Maine, New Hampshire, Massachusetts and Connecticut in my list. Such a wide distribution having been found for this blue-fruited huckleberry in so short a time since its first publication as a variety, doubtless it is widely scattered over all the New England States.

*Gaylussacia resinosa*, forma *leucocarpa*, Britton. I find in the Gray Herbarium a specimen of this white-fruited form of our common huckleberry, collected in August, 1892, at Brunswick, Maine, by Miss Kate Furbish who states on the label accompanying the plant that the berries are white and translucent. See Porter, Torr. Bull., XVI, 1889, p. 21, and Britton, Torr. Bull., XVII, 1890, p. 125. This name should be introduced with a cross in my list.

*Kalmia glauca*, Ait. Mr. E. B. Harger collected this species in Woodbury, Connecticut, May 26, 1899, and recorded it in RHODORA, II, p. 125. I have seen his specimens in the Herbarium of the New England Botanical Club and a cross should represent it in my list. Mr. J. N. Bishop has sent me specimens of the same species which he collected at Burlington, Connecticut, on June 3, 1900. He says that the plants were very abundant. *Kalmia glauca* was reported from Spectacle Ponds, Kent, in the same state, by Mr. C. K. Averill in RHODORA, I, p. 40.

*Kalmia latifolia*, L. This species was credited by me to Vermont in RHODORA, I, p. 136. This state should be represented by a cross in my list.

*Loiseleuria procumbens*, Desv. This northern species was found in various localities on Mt. Katahdin, Maine, in July, 1900, by Messrs. J. R. Churchill, M. L. Fernald, and E. F. Williams. I have seen specimens in Mr. Fernald's and Mr. Churchill's herbaria. A cross should represent it in my list.

*Pyrola rotundifolia* var. *uliginosa*, Gray. Mr. Fernald has collected this variety in a bog in Crystal, Aroostook County, in the northern part of Maine, in August, 1900. I have seen it in his herbarium. This should be marked with a cross in my list.

*Rhododendron canescens*, Michx. This species is found in New Hampshire, Vermont, Massachusetts and Rhode Island as far as my examination has gone. I have studied the following specimens: — New Hampshire, Walpole (*M. L. Fernald*), Jaffrey (*E. F. Williams*): Vermont, Manchester (*Mrs. W. H. Graham & Mary A. Day*), Lake Dunmore (*Ezra Brainerd*), West Rutland (*E. F. Williams*): Massachusetts, Concord (*H. Mann*), Ashburnham (*S. Harris*), Montague (*J. R. Churchill*), Mt. Toby, Leverett (*J. R. Churchill*), Pittsfield (*W. Oakes*): Rhode Island, Providence (*G. Thurber*). These states should each be represented by a cross in my list.

*Rhododendron nudiflorum*, Torr. This species is found in Massachusetts, Rhode Island and Connecticut as far as I have been able to find out. I have examined specimens from Massachusetts, Dedham (*H. A. Young*), Norwood (*E. F. Williams*): Rhode Island, Warwick(*J. F. Collins*), Providence(*G. Thurber, J. F. Collins*): Connecticut, Bridgeport (*E. H. Eames*), Southington (*L. Andrews*). These three states should each be represented by a cross in my list.

In studying these species it has been impossible to see the types, and I have accordingly availed myself of the best and most reliable descriptions that I can find in which the important characters are clearly contrasted. These are in the Illustrated Flora of Britton and Brown. In all the cases above mentioned the specimens bear out well the characters as drawn, but I have seen several in which there is an admixture of the characters of the two species which I think it worth while to cite. In specimens from Townsend, Massachusetts; Cranston, Rhode Island (*J. F. Collins*), and Southington, Connecticut (*C. H. Bissell*), the plants are *nudiflorum* with the flowers of *canescens*, having the tubes densely glandular. In the Herbarium of Brown University there is a specimen from the Herbarium Olneyanum, with no other locality than Rhode Island, exhibiting the same peculiarities. In a specimen from near Bellefont, Rhode Island (*J. F. Collins*), the plant is *canescens* but the pedicels are strigose, a character belonging to *nudiflorum*, the pedicels of *canescens* being glandular. In a specimen from Southington, Connecticut (*L. Andrews*) the leaves of *nudiflorum* are combined with the densely glandular fruit and pedicels of *canescens*.

Such a marked interchange of characters in these two species as is indicated in the above specimens presents a subject worthy of much careful consideration. Their validity as distinct species is called into question or else the characters must be very differently drawn. Observers in the field should examine these plants wherever met with, and I should be very glad to receive specimens or notes from any part of New England that will throw light on the constancy or inconstancy of *Rhododendron canescens* and *nudiflorum*.

*Rhododendron viscosum*, var. *nitidum*, Gray. Dr. E. H. Eames has sent me for examination a specimen of the above variety, with small shiny leaves, an inch or less in length. The plant compares well with specimens in the Gray Herbarium. It was collected by Dr. Eames at Huntington, Connecticut, on September 11, 1893, and was "abundant in a large peat bog, with *Vaccinium Oxycoccus*, L. and *V. corymbosum*, L., etc., while with it grows *Gaylussacia dumosa* (the only station known to me in this vicinity) with the usual plants of such situations." This is the second New England station that I know of for this variety, which must now be entered in my list with a cross.

My authority for the occurrence of *Rhododendron viscosum*, var. *nitidum* in Massachusetts is the Flora of Nantucket, published by Mrs. M. L. Owen in 1888. Mr. L. L. Dame discovered the plant near Sesachacha, and he writes me that Dr. Asa Gray named the specimen which was for some reason not preserved.

*Vaccinium corymbosum* var. *atrococcum*, Gray. Pres. Ezra Brainerd has shown me a specimen of this form, collected on the margin of Bristol Pond, Bristol, Vermont, July 5, 1898, by Mr. A. C. Dike, and recorded in the Flora of Vermont by Brainerd, Jones and Eggleston, 1900, p. 68. This must now have a cross against it in my list.

*Vaccinium pennsylvanicum*, var. *angustifolium*, Gray. Dr. C. B. Graves discovered this alpine form of our common Dwarf Blueberry in a sphagnous meadow near the edge of Great Cedar Swamp, in Voluntown, Connecticut, on June 17, 1899, and published it in RHODORA, III, p. 65. I have examined specimens of the plant deposited in the Gray Herbarium. It is a singular jump from the high mountain tops of Maine, New Hampshire and Vermont to a spot in Eastern Connecticut but 260 feet above sea level. In reply to my inquiry as to its habitat, relative abundance, etc., Dr. Graves writes under date of March 16, 1901, "Great Cedar Swamp is an extensive white cedar swamp bordering Pachaug River and its branches in Voluntown. The point where I found the *Vaccinium* was on the eastern edge where some woody growth, bushes and small trees, red maples, etc., had been cut off, leaving a small and low knoll a little less wet than the sphagnous meadow which surrounded it except on the landward side. . . . There was a small patch a yard or so square with only a few plants. I do not remember seeing any of the ordinary form there. Associated plants were *Lonicera caerulea*, *Rhodora canadensis*, *Carex vestita*, while near by were *Ilex glabra*, *I. laevigata*, *Azalea viscosa*, var. *glauca*, *Nemopanthes fascicularis*, *Arethusa bulbosa*, *Carex bullata*, *stricta*, *filiformis*, *Eriophorum paucinervium* and others. I cannot account for its presence here; certainly the cutting off of the woodland would not explain it. Some of the plants mentioned are also northern, and in another portion of the swamp I found *Chiogenes* and *Clintonia borealis*, both rare in this county; also *Cornus canadensis*." A cross should mark this in my list.

*Vaccinium pennsylvanicum*, var. *nigrum*, Wood. Mr. J. R. Churchill collected on July 17, 1886, in the Blue Hills Reservation, Quincy, Massachusetts, the typical form of this species with blue berries, and near by the variety with black berries without bloom. The contrast between the two forms was noted at the time. I have seen these specimens in Mr. Churchill's herbarium.

Mr. W. W. Eggleston collected this form on Twin Mountains, West Rutland, Vermont, on July 1, 1899, and recorded it in the Flora of Vermont, 1900, p. 69. I have seen Mr. Eggleston's specimens both in Dr. Brainerd's herbarium and my own. These two states should each be represented by a cross in my list.

CAMBRIDGE, MASSACHUSETTS.

## SCUTELLARIA PARVULA AND S. AMBIGUA.

M. L. FERNALD.

THE dwarf skullcap, although not a common plant in New England, is known at a few stations in Maine, Vermont and Connecticut. The Maine and Connecticut plant, however, differs in one striking characteristic from specimens from Lake Champlain and adjacent Quebec; the former being minutely puberulent or glabrate, the latter densely pubescent with spreading viscid hairs. Examination of herbarium material shows that both these forms are widely distributed in North America, and an attempt to place them satisfactorily has brought to light an interesting history.

Michaux published *Scutellaria parvula*[1] in 1803 characterizing it as follows: "S. pusilla: dense pubescens: foliis ovalibus, integris, omnibus conformibus: floribus axillaribus. *Obs.* Affinis *S. minori.* Folia sessilia, parvula, ima interdum subdentata. *Hab.* in regione Illinoensi et Canada."

Pursh, although he cited an additional region (Virginia) for the plant, added nothing important to the characterization of the species, for he quoted Michaux's description. Sir William Hooker, however, published a plate of the species in 1825, and although in the drawing the pubescence of the stem is not brought out, that character is emphasized in his description: "*plant* everywhere covered with short glandular pubescence."[2] The ample description made apparently from material collected in Canada either by Mrs. Shepard, Mr. Goldie, or Dr. John Richardson agrees in detail with the Lake Champlain plant and with Quebec specimens in the Gray Herbarium collected by Mrs. Shepard, herself (whose plant is cited by Hooker in his Flora Boreali-Americana) and by Macrae. This plant, a common species in Illinois and the only form known to us from Quebec, may be taken without hesitation to represent the true *S. parvula* of Michaux collected, "in regione Illinoensi et Canada." It is not restricted, however, to these regions, but as already stated has a broad range, from Quebec and northern Vermont to Michigan (and the Saskatchewan?) south to Tennessee and Texas.

The other form, the smoothish plant of Maine and Connecticut, is likewise of broad range, and it was first described by Nuttall, in 1818, as *Scutellaria ambigua*, "Stem 4 to 6 inches high, smooth, mostly purple."[3] It was soon reduced, however, to *S. parvula*, and since the publication of Hooker's Flora Boreali-Americana it has apparently remained in unmerited but uninterrupted oblivion. Under the name *S. parvula* both the smoothish and the glandular-hairy plants passed among American botanists until the publication of the Synoptical Flora. There, although he still followed the tradition of treating both the common forms as *S. parvula*, Dr. Gray described as var. *mollis* a very hairy and overgrown plant of the Mississippi bottoms. Although these plants of Dr. Gray's var. *mollis* are much larger (nearly 3 dm. high) and stouter

[1] Michx. Fl. ii. 11.

[2] Hook. Exot. Fl. ii. t. 106.

[3] Gen. ii. 37.

and with larger leaves than in specimens of less favored soils, they cannot be otherwise separated from the very pubescent plant left by him to represent in part true *S. parvula*.

That the very pubescent *S. parvula* of Michaux and the smoothish plant associated with it are marked extremes there can be no doubt, but, differing only in the degree of pubescence and in an inconstant tendency in the leaves, they seem better treated as varieties than as distinct species. The smoothish plant, which has been carefully identified with Nuttall's type kindly placed at the writer's service by Mr. Stewardson Brown of the Philadelphia Academy of Sciences, should take as its varietal designation the name given it by Nuttall as a species.

In the Botanical Club Check List Dr. Britton raised to specific rank Dr. Gray's *Scutellaria parvula*, var. *mollis*, the overgrown pubescent plant of the Mississippi valley, and he gave it the specific name *S. campestris*.[1] That this large form has nothing but its size to distinguish it from the ordinary pubescent plant we have already stated, and this view is supported by Dr. Britton's treatment of the two forms in the Illustrated Flora. There *S. parvula* is described as "glabrous, or slightly pubescent," and *S. campestris* "densely pubescent all over." Thus it seems that the name *S. campestris*, Britton, was intended to cover not merely the large *S. parvula*, var. *mollis*, Gray, but all the forms which are "densely pubescent all over." If, however, we are to treat the two forms as specifically distinct, we must take for the smooth plant of the Illustrated Flora (*S. parvula*, Britton) its Nuttallian name *S. ambigua*; and to the pubescent plant, recently described by Dr. Britton as a new species, we must apply Michaux's name *S. parvula*, given to the plant which is "dense pubescens," or as expressed by Hooker "everywhere covered with short glandular pubescence."

The two forms, which in their extremes may usually be recognized, are distinguished as follows:

S. PARVULA, Michx. Plant strongly stoloniferous and producing moniliform tubers: stems simple or branched, mostly clustered, 0.8 to 3 dm. high, pubescent with spreading often viscid hairs: leaves ovate or ovate-oblong, more or less pubescent, entire or sparingly toothed, at most 1.2 cm. broad, all but the lowest sessile: flowers axillary, the pedicels about equalling the hairy calyx: corolla slender, blue, 0.5 to 1 cm. long: seeds strongly papillose. — Fl. ii. 11; Hook. Exot. Fl. ii. t. 106, & Fl. Bor.-Am. ii. 115; Gray, Syn. Fl. ii. 380 (in part) including var. *mollis*. *S. campestris*, Britton, Mem. Torr. Club, v. 283, & in Britton & Brown, Ill. Fl. iii. 82, fig. 3084. — QUEBEC, without locality (*Mrs. Shepard*, *Macrae*): VERMONT, North Ferrisburg, June, 1881 (*E. & C. E. Faxon*); dry barren soil, Burlington, July, 1894 (*L. R. Jones & W. W. Eggleston*), June, 1896 (*A. J. Grout*): NEW YORK, Dexter (*Alphonso Wood*): OHIO, limestone soil, Ottawa Co., June, 1895 (*E. L. Moseley*): MICHIGAN, without locality (*Houghton*); Iona, 1877 (*E. F. Smith*): ILLINOIS, Fulton Co. (*J. Wolf*); sandy banks of the Mississippi, Oquawka, June, 1873 (*H. N. Patterson*): TENNESSEE, open woods, Henderson, May, 1893 (*S. M. Bain*, no. 38): MISSOURI, St. Louis, April, 1844 (*G. Engelmann*); Montier, May, 1894 (*B. F. Bush*, no. 316): TEXAS (*Wright*, &c.). Passing to

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[1] Mem. Torr. Club, v. 283.

Var. **ambigua**. Stem and leaves sparingly appressed-puberulent or glabrate: leaves often more oblong and entire, but sometimes ovate and toothed. — *S. ambigua*, Nutt. Gen. ii. 37. *S. parvula*, authors, in part; Britton l. c. 81, fig. 3083; not Michx. — MAINE, gravelly bank, Dover, Sept. 1896 (*M. L. Fernald*, no. 466); exsiccated clay soil, North Berwick, July, 1895 (*J. C. Parlin*, no. 305): CONNECTICUT, East Haven, 1855 (*Geo. Thurber*): PENNSYLVANIA, woods, Schuylkill River (Herb. Acad. Nat. Sci. Phila.): OHIO, dry and open forests — *type* (*Thos. Nuttall*, Herb. Acad. Nat. Sci. Phila.): KENTUCKY, Lexington, 1835 (*C. W. Short*): ILLINOIS, without station, 1845 (*S. B. Mead*); near Oquawka, Aug. 1873 *H. N. Patterson*): WISCONSIN, Milwaukee (*I. A. Lapham*); Madison (*T. J. Hale*): IOWA, Ames, June 1897 (*R. Combs & C. R. Ball*): MISSOURI, Independence, May, 1894 (*B. F. Bush*, no. 825): KANSAS, prairie, Riley Co., May, 1895 (*J. B. Norton*, no. 411): LOUISIANA (*Hale*): TEXAS, (*E. Hall*, no. 453).

GRAY HERBARIUM.

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LYSIMACHIA PUNCTATA IN EASTERN MASSACHUSETTS.—*Lysimachia punctata*, L., which although not mentioned in the 6th edition of Gray's Manual, is illustrated in Britton and Brown's Flora, has been found growing in a wild state at Brockton Heights near the Easton line. It was first discovered here in the summer of 1900. This is one of the rarest of the genus, the only other station known for this species near here being at Whitman, Massachusetts. The few plants found near Easton are unfortunately in danger of extermination by enthusiastic plant hunters of this vicinity.—ARTHUR CLARK, North Easton, Massachusetts.

# NOTES ON THE EMBRYOLOGY OF SOME NEW ENGLAND ORCHIDS.[1]

R. G. Leavitt.

(Plate 33.)

Owing to the fact that work on the native orchids was planned late last season, the material at present in hand represents only advanced stages in the development of the embryo in most cases. Yet even this has shown some things that are of considerable interest. The remarkable diversity which prevails in orchids with respect to the suspensor is well illustrated; and the ripened seeds have shown so many instances of polyembryony of a particular type that one might suspect such polyembryony of being a family characteristic.

Goodyera tesselata and pubescens. The embryos of both these species (Figs. 1, 3, 4) seem to lack the suspensor. That such is the case with *G. pubescens* is clearly indicated by the few-celled stage represented in Fig. 3. The hemispherical terminal cell (*c*) doubtless represents the suspensor: but it goes to form a permanent part of the embryo proper. In *G. discolor*, according to Treub,[2] this cell pushes out of the embryo-sac, elongates to thrice the length of the mature embryo, and serves to bring food-matters from the basal region of the developing seed, to the coat of which it is closely applied, though it does not reach the ovary wall itself, the source of supplies.

*Listera ovata* and *Epipactis palustris* are figured by Treub[3] and are shown to develop no suspensor. So that we have with *Spiranthes cernua* and the (probable) case of *Goodyera pubescens* representatives of four nearly related genera in which all cells derived from the fertilized egg are included within the germ itself. Usually in angiosperms the egg-cell after fertilization divides transversely into two cells. The one toward the centre of the sac ("embryo-cell") ultimately gives rise to a large part, and sometimes to the whole, of the embryo proper. The other produces the suspensor, generally a row of cells attached by the end to the wall of the sac, and acting to push the embryo down into the nourishing endosperm, or to draw nutritives from the nucellus. The suspensor finally perishes. Fig. 2 illustrates the usual differentiation of the new monocotyledonous individual into two regions, suspensor and "embryo proper"; though in this species (*Limnocharis emarginata*) the end-cell of the feeding-organ is uncommonly large. That the simplification of the germ, characteristic of the orchid family, should in the above named species include the omission of so radical a step in early development as the differentiation of the embryo into temporary and permanent regions, is a noteworthy feature of the embryogeny.

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[1] Continued from p. 63.

[2] Notes sur l'embryogenie de quelques Orchidées, pl. IV.

[3] Op. cit., pl. II., III.

*Polyembryony*. Occasional doubling of the embryo has been noted heretofore in a small number of orchid species, including representatives of *Cypripedium*, *Orchis*, and *Gymnadenia*. I find twin embryos in both the present species of *Goodyera*. Apparently here as in certain ascertained cases both embryos originate in the same sac, though I have seen examples only in the ripe seeds. However, both are often plainly invested by a common membrane, probably the remains of the sac with contiguous cells. Strasburger supposed that in the double-embryoed species there are occasionally two egg-cells in the same sac.

The percentage of polyembryonous seeds must be very small, though I have been able to find from one to three or four instances in each slide of seed examined. The close appression of the embryos — one being smaller than the other and lying more or less in a concavity of the larger one — makes it rather hard to distinguish the twin-seeds from the rest. It should be mentioned that supposed hybrid seed (from pollen of *G. tesselata* upon *G. pubescens*) gave a much larger proportion of twins than seed of either parent.

APLECTRUM HIEMALE. Double embryos (Fig. 7) occur about as frequently as in the *Goodyera* species. Both members of the pair have the remains of suspensors (*s*). This fact is important as indicating similarity of origin, and precluding the idea that doubling results from fragmentation of an original single embryogenic mass.

CORALLORHIZA MULTIFLORA. As seen in the nearly ripened seed (Fig. 8) the suspensor (*s*) comprises two very long cells. It is plainly an organ of absorption, for it passes out of the exostome and plunges its tip into the tissue of the placenta.

I have found, after much looking, a single two-embryoed seed. The embryos were very closely pressed together, but each had its suspensor.

Habenaria tridentata. In diembryonic seeds, which are not uncommon, the embryos lie side by side (Fig. 6), have separate suspensors (*s*), and are similarly oriented.

Habenaria blephariglottis. When two embryos are present (Fig. 5), they are plainly to be seen, as one lies ordinarily a little above the other and both embryos keep their roundness well. The proportion of twin-seeds is small.

This species shows a somewhat striking elaboration of the suspensor, which comprises at least six or seven cells (Fig. 10). Nearly all the cells emit processes, some short and fingerlike and reaching out laterally to the seed-coats or placenta, others filamentous and running parallel with the body of the suspensor into the tissue at the base of the seed-stalk. All these prolongations are filled with dense protoplasm. The processes of the terminal cells are insinuated between the cells of the placenta. The whole apparatus seems to be a well-devised instrument of nutrition.

The embryo lies at the centre of the field which every now and then we hear characterized as peculiarly exempt from modifying influences. Features of the reproductive system, so it has been said, are relatively constant from group to group in any evolutionary series, as compared with characters of the vegetative system. Yet as a matter of fact the moulding forces reach even the embryo rather directly in many cases. Thus in the family under discussion the adaptive tendencies in the matter of seed-dispersal have worked first to reduce the size and specific gravity of the seed as a whole. The mature seed has but one coat and that is air-filled. Both perisperm (nucellus) and endosperm have been done away with. The germ itself has lost distinction of stem and leaf. Finally, in the absence of the usual means of feeding the growing embryo, complicated sucking-organs (suspensors) have often been developed; and the diversity which obtains within the limits of this one family in this respect is remarkable. In some tropical species, as for instance *Phalaenopsis grandiflora* (Fig. 9), the cells of the "suspensor" grow out in tubular fashion not only toward the exostome, but also in the opposite direction, so that the embryo proper is enveloped by the filaments.

With regard to twin-embryos, it should be noted that we now have them in both diandrous and monandrous divisions and in all the tribes of the family. It is my purpose the coming summer to determine, if possible, the precise origin of the supernumerary embryo.

THE AMES BOTANICAL LABORATORY, North Easton, Massachusetts.

EXPLANATION OF PLATE 33. Fig. 1, twin embryos of *Goodyera tesselata.* Fig. 2 (after J. G. Hall), young embryo of *Limnocharis emarginata.* Fig. 3, embryo of *Goodyera pubescens* while still composed of few cells. Fig. 4, twin embryos of same species. Fig. 5, twin embryos of *Habenaria blephariglottis.* Fig. 6, same of *H. tridentata.* Fig. 8, seed of *Corallorhiza multiflora.* Fig. 9 (after Treub), embryo with filamentous appendage, in *Phalaenopsis grandiflora*; *e*, the embryo proper. Fig. 10, the suctorial suspensor of *Habenaria blephariglottis.* In all cases *s* indicates the suspensor, or its remains.

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CHLORANTHY IN ANEMONELLA THALICTROIDES. — From Miss Emily T. Fletcher I have recently received an interesting specimen of *Anemonella thalictroides*, Spach. It has eight flowers in the usual umbelliform inflorescence, the central one being much shorter-stalked and somewhat larger than the rest. In all the flowers the sepals are small (2 to 4 mm. long) and green, instead of white and petalloid as usual. The stamens are all converted into sessile elliptic-oblanceolate green and sepaloid structures. They are 1.7 to 2.4 mm. long and rounded at the apex. The carpels are of the usual number and shape and are provided with stigmas of normal appearance. Miss Fletcher writes that the specimen was collected on the Bunce Farm at Westford, Massachusetts, where this peculiar form of the plant has been known to grow for six or seven years.

In the Gray Herbarium I find a specimen from Waterbury, Connecticut, collected and sent to Dr. Gray by Mr. W. H. Patton. In this plant the inflorescence seems originally to have been 6-flowered, although only three flowers have matured. Of these the central one, which is long-stalked and larger than usual (nearly 2 cm. in diameter) is completely transformed by chloranthy. The sepals are green although bordered with white. The stamens are represented by narrow flat elliptic-oblong slender-stiped structures, very different in their attenuate stipitate bases from those in the Westford plant. The carpels are also modified to very short and sessile but somewhat leaf-like members, quite destitute of stigmas.

I have found in literature only one mention of chloranthy in *Anemonella thalictroides*, namely in case of a plant exhibited at the Torrey Botanical Club by Dr. Arthur Hollick in 1881 (Bull. Torr. Club, viii. 60), which is described merely as having the sepals green. To what extent the other floral organs were modified is not stated, so it is impossible to tell whether it corresponded to either of the two forms here considered. Mr. Thomas Meehan (Bot. Gaz. v. 64) and Mr. George R. Kleeberger (Bull. Torr. Cl. vii. 97) have called attention to the occurrence of double flowers, both white and roseate, in *Anemonella thalictroides*. — B. L. Robinson, Gray Herbarium.

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Extreme Variations of Alisma Plantago. — The common Water-plantain, *Alisma Plantago*, of marshy places has ovate or oblong leaves, and is known throughout the northern hemisphere. In Europe, besides this typical form, two well-marked varieties of the species have been recognized. These extremes, however, are not confined to Europe, but are occasionally found in northern regions of America. As they are likely to occur in the northeastern states and adjacent Canada, attention is here called to their peculiarities and to their present known stations in America.

Alisma Plantago, L., var. lanceolatum, Hoffm., Deutschl. Fl. (1800) i. 175. Plant usually small: leaves slender-petioled, lanceolate. Lake Superior (*Loring*): Lake Winnipeg Valley (*Bourgeau*): South Dakota, Black Hills (*E. Coues*): Idaho, Kootenai County (*Sandberg, MacDougal & Heller*, no. 935).

var. graminifolium, Wahlb. Fl. Ups. 122. Leaves mostly floating and linear. North Dakota, stagnant water, Leeds (*J. Lunell*). — M. L. Fernald.

## THE HERBARIA OF NEW ENGLAND.

Mary A. Day.

(Continued from page 71.)

**Brainerd, Ezra,** Middlebury, Vermont. — President Brainerd has collected a herbarium of about 6000 species, which contains nearly all the North American ferns and Carices, and most species included in the Gray Manual. The collection is strong in the plants of Vermont and contains much of the material upon which the recently issued Flora of Vermont by Messrs. Brainerd, Jones, and Eggleston was based.

**Brewer, William Henry,** NEW HAVEN, CONNECTICUT.— Nearly all the private collection of Prof. Brewer has been given to the Department of Agriculture, Washington, but he retains a small unmounted portion. A nearly complete set of his plants of the Geological Survey of California is in the Gray Herbarium.

**Brown University,** PROVIDENCE, RHODE ISLAND. — The basis of this herbarium is the collection of Col. Stephen Thayer Olney which was given to Brown University before his death in 1878. Here also may be found the collection of Mr. James Lawrence Bennett, the smaller one of Dr. Brownell of Hartford, and a good fern collection of cosmopolitan range from Miss Anna Stout of New York. The herbarium contains about 40000 sheets and some 60000 specimens. It is well arranged although as yet only partially mounted. It is in charge of J. Franklin Collins, Curator.[1]

**Bumsted, F. M.,** see Williams College.

**Burt, Edward Angus,** MIDDLEBURY, VERMONT. — Dr. Burt commenced collecting specimens about twenty years ago while a student, but the larger part of his herbarium has been accumulated during the last eight years. Of phaenogams he has about 700 species collected by himself in eastern New York. The cryptogams are more fully represented and of wider range, the chief part being fungi, though lichens, mosses, and some algae are included. These are from United States and Europe. Dr. Burt is developing his herbarium along the lines of *Basidiomycetes*, *Ascomycetes*, and *Myxomycetes*, making it of special value as a working herbarium and including in this part about 500 specimens of the rarer European species. Among the collections represented are Calkins, North American lichens; Collins, Holden, & Setchell, Phycotheca Boreali-Americana; and Ellis & Everhard, Eleven centuries of North American fungi.

**Carey, John.** — The first collection which Mr. Carey made was destroyed by fire in New York. The American botanists endeavored to repair this loss, and another large herbarium was formed, critically studied, and carefully annotated. In 1869 Mr. Carey presented this collection to the Kew Gardens. It is therefore in charge of Sir W. T. Thiselton Dyer, Director of the Royal Gardens, Kew, England.

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[1] The Herbarium of Brown University has just acquired by purchase the valuable collection of Prof. W. W. Bailey, described in RHODORA, iii. 69.

**Chamberlain, Edward Blanchard,** Providence, Rhode Island. — Mr. Chamberlain's herbarium contains about 2300 specimens, of which 1550 are phaenogams and vascular cryptogams, and 750 are mosses. The phaenogams were collected in Bristol, Lincoln County, or Brunswick, Cumberland County, Maine, and the mosses in the eastern part of the United States, though the larger part are from Maine.

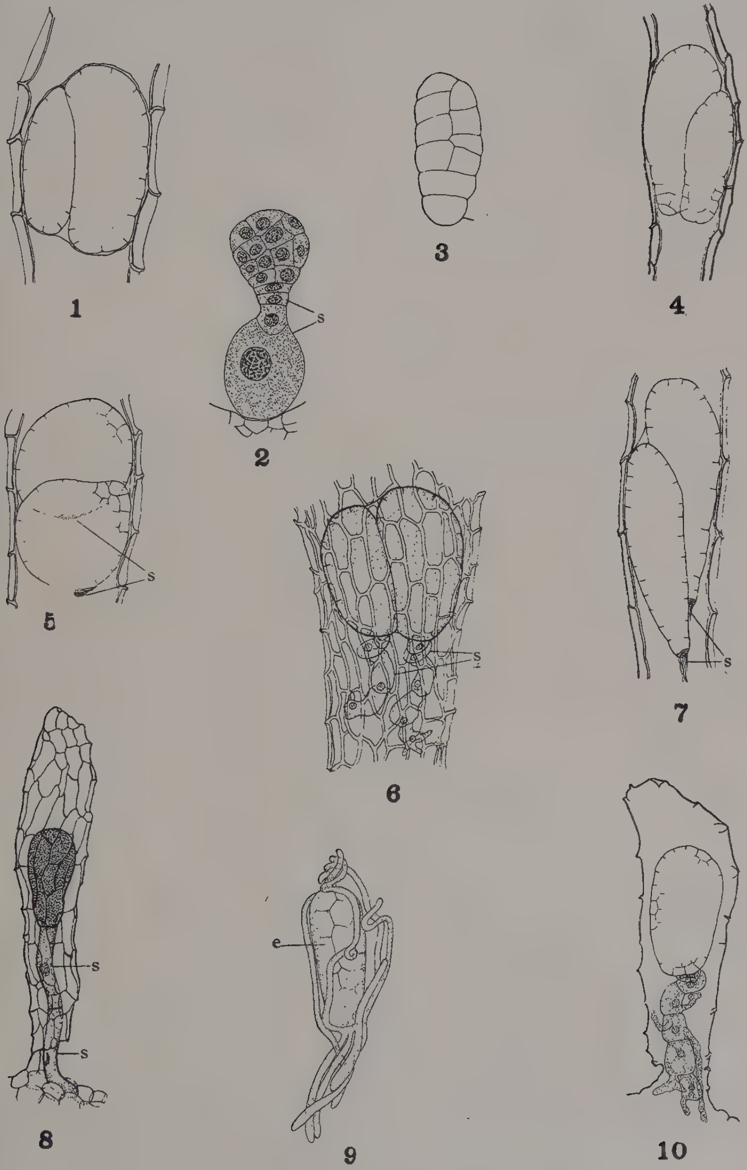
**Chadbourne, Paul Ansel.** — The private herbarium of President Chadbourne was, during his life, deposited at Williams College. After his death it was purchased from his heirs and given to Bates College, Lewiston, Maine, where it now remains.

**Churchill, Joseph Richmond,** Dorchester, Massachusetts. — The herbarium of Judge Churchill contains about 5500 sheets, representing 2250 species and named varieties. Nearly all of them, probably 2200 species, are from the region covered by Gray's Manual; the remainder were collected by Judge Churchill in Florida in 1897, and in North Carolina in 1899. The unique feature of this herbarium is that not only were all the plants collected by Judge Churchill, but from the field to the mounted specimens all the work has been done by himself alone. He has made no exchanges and declined all gifts. Notwithstanding this, he has an almost complete representation of the New England flora, and many plants from the Middle and Southern States. The collection was begun in 1869, and much care has been taken to gather the plants in both flower and fruit, to make full specimens, and to have them accurately and fully identified. The herbarium is general so far as the flowering plants, ferns, and fern allies are concerned; the genus *Carex*, which numbers about 360 sheets, is perhaps exceptionally well represented.

**Collins, Frank Shipley,** Malden, Massachusetts. — This private collection has been accumulating for twenty years and represents the algae from all countries. It contains about 10000 sheets, and includes a full set of Collins, Holden, & Setchell, Phycotheca, Boreali-Americana. It is undoubtedly the best collection of algae in New England, with the exception of the Cryptogamic Herbarium of Harvard University.

(*To be continued.*)

*Vol. 3, No. 30, including pages 147 to 190 and plates 25 to 32, was issued 10 June, 1901.*



Embryology of Orchids.

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Almost immediately upon leaving Oldtown, the home of the Penobscot Indians, one feels that he is in the woods, and every minute of the ride will make him impatient to stop the train for the tantalizing plants which flash by in the clearings or by the streams. In fact, the true botanist will inevitably moralize to himself on the desirability of through vestibuled trains and parlor cars, and he may decide to take the freight train at the next station.

If he has spent hours about home searching for something really new to him, he will start with delight as he sees the fields and banks of blue *Aster Lindleyanus* just above Oldtown, or the clearings crimson in September with the drooping tassels of *Polygonum Careyi*. Or, if he is fortunate enough to get off in May, he will be greeted from recent clearings by fragrant white masses of Sweet Coltsfoot, *Petasites*.

Just beyond Alton, he cannot help longing to explore the indefinite miles of Sphagnum swamp, and if he looks to the West, he will see a beautiful little round pond bordered by gnarled Black Spruces, which he instantly knows must be covered with the tiny Mistletoe, *Arceuthobium pusillum*. Alton bog is well worth exploring, but it is only a small area compared with the hundreds of miles of such country through North-central Maine, and unless one has plenty of time he should save that and his enthusiasm for "farthest north."

If one is bound for Moosehead Lake he will follow the Piscataquis River, where, along the banks, or in the neighboring woods and swamps, he will find at different seasons many good things, among them *Anemone riparia*, *Epilobium palustre*, *Erigeron hyssopifolius*, *Antennaria petaloidea*, *Senecio Balsamitae*, *Vaccinium caespitosum*, *Pyrola asarifolia*, *Primula mistassinica*, *Calypso*, *Allium Schoenoprasum*, *Carex deflexa* and *Lycopodium sabinaefolium*.

If he wants the rare **CALAMAGROSTIS NEMORALIS** he should visit the Chocorua-like peak of Boarstone Mt., on Lake Onawa (reached from Monson).

When he reaches Moosehead and Mt. Kineo he will naturally want to

## BANGOR AND AROOSTOOK RAILROAD.

get **CAREX PORTERI**, *C. saxatilis*, var. *miliaris*, and *C. Grahami* from the gravelly shores or low woods; and on Kineo he will look for *Draba incana*, var. *arabisans*, *Primula farinosa*, *Shepherdia canadensis*, *Carex capillaris*, and *Aspidium fragrans*.

In the Katahdin Iron Works region, too, the botanist will be very happy, but the great botanizing begins as he approaches southern Aroostook County. From the main line of the railroad beyond the Katahdin Iron Works district one has some splendid views of Mt. Katahdin itself with the neighboring masses of Sordnahunk and Traveller Mts. If one does not make up his mind at once to explore the giant amphitheatres and castellated ridges of Katahdin, he is no true lover of the best of botanical exploring and of inspiring mountain life. (For detailed account of Katahdin and its flora, as far as known, see RHODORA for June, 1901.)

At Crystal flag-station one should stop long enough to explore a bit of the great bog which furnishes the upper waters of Molunkus Stream. Following the railroad back half a mile he will find himself surrounded by masses of *Betula pumila*, *Lonicera oblongifolia*, and other northern shrubs, with an herbaceous flora including *Parnassia caroliniana*, **DROSERA LINEARIS**, *Valeriana sylvatica*, *Aster junceus*, *Pyrola rotundifolia*, var. *uliginosa*, *Tojieldia glutinosa*, *Carex chordorhiza* and *C. livida*.

If he wishes to stop for some time in the region (and who does not) he can have good accommodations at Island Falls; and there, near the Mattawamkeag River, he will get the local **ANTENNARIA RUPICOLA**, *Hieracium vulgatum*, *Erigeron acris*, and *Halenia deflexa*. In the river, itself, and in Mattawamkeag Lake he will revel in September, dragging up such prizes as *Myriophyllum Farwellii*, *M. alterniflorum*, and *Potamogeton obtusifolius*.

When Houlton is reached one should make up his mind to stop at some of the numerous villages between there and the Aroostook River, for the Cedar (Arbor-vitae) swamps of the Meduxnakeag and the Presque Isle valleys are the homes of *Cypripedium spectabile*, *Microstylis monophyllos*, *Carex vaginata*, and scores of other species of absorbing interest.

The valleys of the Aroostook and the main St. John — for instance at Fort Fairfield, Van Buren, Fort Kent, and St. Francis — furnish one of the most striking floras of New England. There among other species one will get **THALICTRUM CONFINE** and **T. OCCIDENTALE**, **OXYTROPIS CAMPESTRIS**, var. **JOHANNENSIS**, *Hedysarum boreale*, **TANACETUM HURONENSE**, **PRENANTHES RACEMOSA** and **P. MAINENSIS**, *Gentiana Amarella*, var. *acuta*, **PEDICULARIS FURBISHIAE**, **SALIX GLAUCOPHYLLA** and **S. ADENOPHYLLA**, **GOODYERA MENZIESII**, *Juncus alpinus*, var. *insignis* and **J. TENUIS**, var. **WILLIAMSII**, *Triglochin palustre*, *Scirpus Clintonii*, **CAREX CRAWEI** and **C. BICOLOR**, *Equisetum palustre* and *E. variegatum*, and *Lycopodium sitchense*.

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